1154-42-2670 **Brendan Marshall Williams*** (brendwil@umich.edu), Brendan Williams, 10835 Bunton Road, Willis, MI 48191, and **Cyril Cordor** (ccordor@umich.edu), Cyril Cordor, 10971 Oak Lane Apt. 4111, Belleville, MI 48111. *Fast Phase Retrieval from Masked Phaseless Fourier Measurements.*

The phase retrieval problem is a fascinating inverse problem that arises in molecular imaging methods like X-ray crystallography as well as in other areas such as speech processing and quantum mechanics. To acquire measurements for a test sample, a coherent beam of radiation is focused on it, causing the beam to scatter. The physics of the diffraction process dictates that the measurements are the squared magnitude of the Fourier transform of the signal admitted by the sample. Because distinct signals can have the same magnitude, different phase factors can generate multiple solutions for the same problem. To encode phase information, we utilize the common approach of acquiring masked (or windowed) measurements. Discrete Fourier analysis is used in conjunction with spectral analysis of strategically constructed, circulant-like matrices to recover the phase accurately and efficiently. However, even today there remain obstacles to flawless phase retrieval such as robustness to noise and computational efficiency. Many phase recovery algorithms used in practice are heuristic in nature and so have no mathematical assurances of obtaining a correct solution. The result of our research was an accurate and efficient 2D phase retrieval algorithm with a strong mathematical backing. (Received September 17, 2019)